

# Bulletin of the Chicago Academy of Sciences

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## New Species of Nearctic Pselaphid Beetles aid a Revision of the Genus *Cedius*

Orlando Park  
*Northwestern University*

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The purpose of this report is the description, integration, and discussion of certain new species of Nearctic pselaphid beetles that have accumulated in the author's collection during the past twenty years. An integral part of this work is a revision of the genus *Cedius* that has been under contemplation since 1934.

### PYXIDICERINI

In the course of field work in the arid Southwest, a series of light traps was operated at night near Superior, Arizona by Dr. Howard K. Gloyd of the Chicago Academy of Sciences. The Pselaphidae were relatively abundant in the samples, and these beetles were sent to the author for study. This material is to be reported upon in detail at a future time, but among the specimens so taken there was a hitherto undescribed species of more than usual taxonomic importance—so much so that it was felt that it should be discussed here, rather than defer its description to an indefinite date when the Arizona pselaphid fauna could be studied as a whole.

The species alluded to is a member of the tribe Pyxidicerini. This is a small tribe of four genera, only one of which (*Bythinoplectus*) is known from the Western Hemisphere. Previously, *Bythinoplectus* was known only from the Neotropical Region (Park, 1942, p. 37). The Arizona species, then, is in a tribe new to the Nearctic. Furthermore, the Arizona record is another datum that indicates a taxonomic bond between neotropical and nearctic pselaphids by way of the Central American bridge.

***Bythinoplectus gloydi* new species (Pl. I)**

*Type Female.* Uniform reddish-golden yellow. Pubescence sparse, semi-erect, bristling, hyaline to slightly flavous, moderately long and conspicuous. Integuments strongly polished with sparse punctures. Head 0.27 mm. long x 0.30 mm. wide through eyes; pronotum 0.27 mm. x 0.27 mm.; elytra. 0.34 x 0.47 mm.; abdomen 0.47 x 0.47 mm.; total length 1.34 mm.

Head, from a dorsal view, in the shape of an inverted T. Eyes slightly hirsute, small and not prominent from a dorsal view, but from a lateral view, elongate oval in form, and consisting of about thirty-eight small, hemispherical facets. Temporal angles absent as such, the eyes being placed at each end of the base of the inverted T, and the head almost rectilinear from the posterior margin of each eye to the well marked occipital constriction. Each "ocular arm" of the vertex sparsely but coarsely granulate; "vertical arm" of the inverted T with a blackened, granulated boundary, and entirely, deeply concave between lateral borders, the concavity being glabrous. A pair of minute vertexal foveae located on a hypothetical line passing through middle of eyes, and each fovea on a hypothetical line that continues the granulated lateral margin of the "vertical arm" (Pl. I, 1). Face bisected dorsoventrally by a thin, vertical, frontal lamina that unites with a very high, slender, clypeal tubercle, and therefore the face is not excavated between the antennal cavities (as in the males of so many *Batrisodes*), but rather is divided into a **huge right** and left fossa each of which receives a complicated maxillary palpus. Labrum very transverse with apical margin concave. Mandibles thin, left crossed dorsal to the right. Ventral surface of head simple, gently convex, bearing short, sparse, aciculate setae as in *Euplectus* without a trace of a median, longitudinal carinal or gular suture, but with a deep gular fovea where the genal field meets the cervicum; laterally, the border of the ventral surface is produced into a wide, hyaline margin that forms the floor of the palpal fossa noted above.

The maxillary palpi are large (so that they fill the palpal fossa on each side of the head), complex, and on casual inspection give the appearance of being articulated to the basal segment of the antennae. The reason for this

erroneous point of view is that in the tribe Pyxidicerini the ordinary, relative proportions of the palpal segments are reversed. In the species under discussion the palpi show the same general organization as that of *Bythinoplectus impressifrons* Raffray of Brazil and Dutch Guiana (Park, 1945a, Pl. III, fig. 2,3). In *gloydi*, with the palpi in repose, the first segment is very minute; the second segment is the largest segment of the palpus and shaped like an inverted and flattened Indian club, the pedunculate basal fifth extends dorsally through a narrow slot formed by the base of the mandible above and the limiting carinoid margin of the gena below, and the remaining four-fifths of the segment forms a large, flattened, fusiform club that fills the palpal fossa from eye margin to labral margin; third segment in two parts, a leaf-like basal piece that is almost as wide as the second segment and is articulated on the dorsal surface of the second segment near its apex, but since in repose the second segment has its dorsal face pressed into the palpal fossa and the ventral face exposed, the basal part of the third segment appears to arise from the lower surface of the second segment; the second part of the third segment is in the form of a small, oval, hirsute ball that is obliquely attached at the apex of the basal piece, so that the third segment in total appears as a V with one arm very much shorter than the other; fourth segment in the form of a glabrous, transverse, oval ball that is wider than long and articulated at the apex of the third segment at the junction of the two parts of the latter. This being the case, one is apt to mistake the fourth for the first, and the second for the fourth segment. This complex appendage is illustrated (Pl. I, 2).

Antennae nine-segmented. This readily differentiates the genus as it is the first with nine antennal segments reported from the United States. The antennae articulate at the apical inferior angles of the frontal arm of the head so that the impression is given that this whole arm is an antennal tubercle. First segment obliquely flattened, oblong, almost as wide as ninth segment; second segment about half as wide as first, very slightly longer than wide, and moniliform; third to eighth segments subequal in size, minute, about half the width of second, and submoniliform, with the exception of the eighth which is trapezoidal; club consisting of the distal (ninth) segment, large, about as long as the five preceding segments united, with truncate base, and gradually narrowed apex, its surface bearing sparse, conspicuous granules.

Pronotum slightly narrower than head through the eyes; a deep, glabrous, lateral fovea each side at basal third and a very shallow, median impression that is bisected by a carinoid elevation (reminding one of *Biblopectus*); disc with a large fovea (reminding one of certain *Euplectus*); surface of pronotum sparsely and distinctly granulate for apical two-thirds, the granulation becoming progressively more dense and conspicuous to the basal margin.

Elytra with prominent subrectangular humeri; each elytron with two relatively large, nude, basal foveae, the sutural at origin of a deep, entire, sutural stria, the discal at origin of a short, streamlined impression that does not extend through more than basal third of elytral length; flank simple.

Mesothoracic wings almost as long as body (1.14 mm. long), strongly iridescent, with the entire margin fringed with alar setae, these latter being graded in length, longest at base and shortest at apex of wing.

Abdomen consisting of five visible tergites and six visible sternites. Lateral margins strongly formed on first three tergites, and narrower but distinct on fourth tergite; a pair of short but strong basal abdominal carinae at the base of each of the first three tergites, these carinae are about one-fourth the segmental length, are separated by about half the total segmental width, and enclose a basal, transverse, heavily pubescent depression; fifth tergite ogival and subvertical in position. First sternite very short, second and third sternites with a short but deep impression along the basal margin, this impression bisected by a low, blackened, carinoid elevation; remaining sternites simple and convex; fourth sternite longer than any of the others.

Prosternum short, transversely tumid, and not bisected by a median carina; mesosternum as long as prosternum, its entire surface densely cribrate; mesocoxae contiguous in confluent coxal cavities; metasternum tumid, not medianly impressed; metacoxae contiguous, with their mesial articulated faces subcylindrical as in euplectines. Legs simple, slender and unarmed. Tarsi typical of Pyxidicerini, apparently one-segmented on casual inspection, but actually consisting of two minute basal segments and a very long distal segment that bears a single tarsal claw.

Described on one specimen, the type, deposited in the author's collection. The unique female was collected in a light trap on the night of July 25, 1948, at the Southwestern Arboretum, 4 miles west of Superior, Pinal County, Arizona, by H. K. Gloyd, for whom this species is named. When males become available, they should be readily recognized, since in this genus, the median vertexal process upon which the antennae are articulated is longitudinally continuous in the female, but is transversely interrupted in the male (Park, 1945a, Pl. III, fig. 2, 3; Park, 1945b, Pl. III, fig. 2, 3).

With the opening remarks concerning this genus in mind, it is of interest to record that of the six previously known species of *Bythinoplectus*, *gloydi* is most closely related to the Mexican *Bythinoplectus denticornis* Raffray known from Tabasco and Morelos. These two species are quickly discriminated in so far as the females are concerned (the males of *gloydi* being unknown): *denticornis* has the antennae relatively much shorter and thicker, the integu-



ments are less shining as a consequence of the more crowded granules, the pubescence is very short, appressed and inconspicuous and the median vertexal process is only slightly impressed medianly; *gloydi* has the antennae relatively elongate and slender, the integuments are strongly shining and the granules larger and sparser, the pubescence is bristling, semi-erect and conspicuous, and the median vertexal process is glabrous and very deeply and entirely excavated.

#### EUPLECTINI

##### *Trimiopectus auerbachii* new species (Pl. II)

*Type Male.* Shining golden yellow. Pubescence composed of short, appressed, flavous setae. Integuments lightly punctulate. Length 1.17 mm. Greatest width 0.45 mm.

Head rounded triangular with prominent eyes occupying about half of the length of the head between occiput and interantennal line of the front, eyes in lateral view deeper than wide, and slightly subreniform. Tempora short, about half as long as an eye, with rounded posterior corners. The top of the head appears to be elevated as a consequence of the eyes being placed far down on the sides of the head. Occiput incised medianly; vertex high, flattened and bearing a pair of nude foveae that are free, not connected by an interfoveal sulcus. A transverse sulcoid depression between frons and vertex. Face simple, with the frontoclypeus steeply declivous to the clypeal bead. Labrum transverse, with slightly concave apical margin. Mandibles prominent, left crossed dorsal to right. In lateral view the circumocular field of the gena has a strong supraocular carina obliquely from center of eye margin dorsally to terminate in a nude fovea beneath the antennal tubercle. This fovea appears to be the homologue of the antennal incisure so well seen in *Batrisodes globosus* (Park, 1947, Pl. I, 1). Ventral surface of head bearing twenty capitate setae. These setae in a basal row of six, a subbasal row of four, a subapical row of four, and an apical row of six; in addition to these capitate setae there is a long, aciculate seta in the subbasal row just internal to the most lateral capitate seta each side, so that this row has six setae, four of which are capitate and two of which are not. It is noteworthy that these capitate setae do not terminate in a sphere as they do in *Melba* (Park, 1942, Pl. IV, 21), but instead, the termination is much longer and more fusiform (Park, 1942, Pl. XII, 1). This is characteristic of the genus. These capitate endings are probably sensory receptors and there is a suggestion that they either transmit or directly secrete a viscous substance since, in the type, most of the capitates are covered with minute particles that have apparently adhered to a sticky surface. In some of the paratypes, these particles are absent, but they

are present in others and, since all of the material was collected in ninety-five per cent ethyl alcohol, there is the further suggestion that the possible secretion contains an alcohol-insoluble component. Maxillary palpi four-segmented, simple; first segment minute; second segment arcuate pedunculate, subcylindrical in basal three-fourths, and swollen in apical one-fourth; third segment subtriangular, with the mesial face more acute, the segment about as wide as the swollen portion of the second; fourth segment almost twice as wide as third, and as long as second and third united with the base rounded-truncate and apex gradually acute to terminate in a small palpal cone set obliquely at apex. Antennae eleven-segmented, simple; from a dorsal view first segment half as long as second, with truncate apex; second elongate oval; third distinctly smaller than second, obconical; fourth to eighth shorter than third, and gradually, slightly increasing in width; club indistinct, composed of the last three segments, typical of the genus, the ninth distinctly larger than eighth, transversely obtrapezoidal, tenth distinctly larger than ninth and transversely obtrapezoidal, but relatively less transverse than the ninth, eleventh slightly wider than tenth and distinctly longer than preceding two united, truncate at base, widest through middle and terminating in a rounded apex.

Pronotum slightly longer than wide, in the ratio of 4:3. Apical and basal margins arcuate; disc simply convex; three large, nude antebasal foveae connected by a transverse sulcus.

Elytra with sloping humeri. Each elytron with two nude basal foveae, the sutural at origin of an entire sutural stria, and the distal at origin of a discal stria that extends almost through the basal half of elytral length; flank simple, with no subhumeral fovea, but with a straight carinoid line that arises in apical third to parallel elytral margin as in *Trimiopectus obsoletus*.

Abdomen with five visible tergites and seven visible sternites. First three tergites with wide lateral margins. First tergite much longer than second, and bearing a minute basal abdominal carina on each side of a transverse, pubescent depression at extreme base of segment in median third of width. First sternite short. Second sternite long, longer than first tergite and medianly very convex. Apical half of second, third, fourth, and basal half of fifth sternites bearing a conspicuous, common concavity on each side (Pl. II, 3). This concavity in sharp contrast to the rather heavily pubescent integument of the venter. Third sternite bears on each side a conspicuous, triangular, laminoid process that extends obliquely over the glabrous concavity just mentioned. Fourth sternite shorter than third; fifth sternite half as long as fourth; sixth sternite as long as fourth, medianly depressed; seventh sternite in the form of a transverse, ovate, penial plate or operculum.

Prosternum simple, not medianly, longitudinally carinate. Intermediate coxal cavities confluent.

Metasternum convex, slightly medianly depressed; posterior coxae subcontiguous, with their mesial faces subconical for articulation with the trochanters, as characteristic of the Euplectini.

Anterior legs with femora swollen and distinctly larger than femora of other legs; ventral faces of anterior femora flattened, this flattened area tending to be scarified toward the anterior face, and bearing two foveoid depressions toward the posterior face. Trochanters of intermediate legs each bearing a short, distinctly triangular tooth at apical three-fourths of ventral face. Tarsi three-segmented, first segment very small; second segment elongate obconical, longer than third; third segment subcylindrical and bearing two tarsal claws, a primary claw that is long, arcuate, and conspicuous, and a secondary claw which is very short, straight, and inconspicuous.

This species is described on four males, the type and three paratypes, in the collection of the author. The type was collected at Glenn, Allegan County, Michigan, August 24, 1948 at 10:00 A. M. C. S. T., from a sugar maple tree hole in a beech-sugar maple forest by Dr. Stanley I. Auerbach after whom this interesting pselaphid is named. A paratype was collected by W. Snow on May 15, 1944, from a tree hole in an American elm at Urbana, Champaign County, Illinois; two paratypes collected by Miss Glenna Corley from a tree hole in a silver maple at Tuscola, Douglas County, Illinois, on June 13 and 29, 1949.

Interestingly enough, the *auerbachii* known so far have been collected only from tree holes. This may be coincidence. On the other hand, *Trimoplectus* is relatively abundant in decaying wood. The genotype, *obsoletus*, described on a male and a female from rotten wood at Cedar Rapids, Iowa (Brendel and Wickham, 1890, p. 51), is known to occur in decaying logs and tree holes. The tree hole is a specialized microhabitat that differs from a decaying log in that the dead substrate of log mold, at least initially, is surrounded by living tree tissue. Evidence accumulating suggests that the pselaphid fauna of tree holes may be quantitatively distinctive (Park, Auerbach, and Corley \* ). So far, *auerbachii* is not reported from the Chicago area, but it may be expected since it occurs just northeast of this region, in neighboring Allegan County, Michigan, and also about eighty miles south of the southern boundary of the Chicago area, e.g., Urbana, Illinois.

\*Park, Orlando, Stanley Auerbach, and Glenna Corley, "The tree hole habitat, with emphasis on the pselaphid beetle fauna," 1950, *in preparation*.

Unfortunately, the female sex is unknown for this species. The male *auerbachii* and male *obsoletus* are easily discriminated on secondary sexual features. The author was able to study the genotype, *obsoletus* Brendel, on October 27, 1948 at the Academy of Natural Sciences of Philadelphia, through the courtesy of A. G. Rehn, Curator of Insects. The holotype of *obsoletus* is a male from Iowa in the Horn collection (H. 9439). This specimen agrees with Brendel's original description in so far as the latter goes. The critical secondary sexual feature of the abdomen was not noted by Brendel. The essential features that allow *obsoletus* and *auerbachii* to be quickly separated are located on the sternites. It will be recalled that in *auerbachii* there is a deep, glabrous concavity occupying the lateral thirds of the third, fourth and base of fifth sternites, and that a conspicuous, triangular, laminoid spine extends from the third sternite over this cavity (Pl. II, 3). In the type of *obsoletus* just referred to, there is no concavity and instead the integuments are uniformly convex, punctulate and pubescent; furthermore, the apparent homologue of the excessive leaf-like spine in *auerbachii* is a minute, oval, apically setose tubercle that is located on each side near the posterior margin of the third sternite (Pl. II, 2). These structural differences appear to be constant between the two species populations. The three male paratypes of *auerbachii* have the lateral cavities and prominent spines of the venter as described for the type; fourteen male *obsoletus* have been examined for these features and are as described for the type of this species in Philadelphia. The differences between the two species of *Trimioptectus* appear to parallel similar differences between the males of *Euplectus*, where in so many cases species criteria are found only in the organization of the sternites of this sex whereas the females can not be separated. Among other differences between these two species are the different sternite proportions as illustrated.

#### BRACHYGLUTINI

##### *Reichenbachia pluridentata* new species (Pl. III)

*Type Male.* Reddish-brown, with maxillary palpi yellowish-brown; pubescence moderately long, semi-erect, golden yellow and conspicuous. Integuments polished and subimpunctate except for pronotal base, where the punctures tend to be coarse and oval, and the elytra, where the punctures are evident and occasionally confused. Length 1.7 mm. Greatest width 0.74 mm.

Top of head, excluding eyes, trapezoidal. Eyes prominent, coarsely faceted; tempora evenly rounded, prominent, as long as eyes; occiput evenly convex and not medianly sulcate. Three foveae present. Each fovea forms a corner of an equilateral triangle; these foveae free, densely pubescent, sub-

equally large, having the diameter of two ocular facets. These foveae consist of a pair of vertexal foveae on a line passing through eye centers, each fovea equidistant between an adjacent eye and the other fovea, and a frontal fovea placed in a depression between the small antennal tubercles. Frontoclypeus simple, gently declivous, with the clypeus terminating in a well-formed basal bead. Mandibles notable, strongly formed, left dorsal to right; inner ramus with three teeth set well behind apex; in addition, each mandible bears a long, strong, apically directed mandibular spine on the external ramus (P1. III, 2). On casual inspection, these mandibular spines give the impression of gaping jaws and remind one of *Reichenbachia bicuspidata* of Guatemala and Mexico (Park, 1945, 1948), but in *bicuspidata* the external mandibular processes are broadly triangular teeth, whereas in *pluridentata* these processes are spinoid. Ventral surface of head with the usual median, longitudinal carinoid elevation. Maxillary palpi as for genus. Antennae eleven-segmented, longer than head and pronotum united, essentially unmodified; basal segment longer than wide; second slightly narrower than first, slightly elongate; third obconical, as long as second but narrower; fourth to eighth as wide as third; fourth, fifth and sixth cylindrical with fifth slightly longer; seventh shorter than sixth; eighth segment smallest; club composed of last three segments, the ninth and tenth obtrapezoidal and progressively wider than eighth; eleventh segment largest, with truncate base and obliquely acute apex and nearly as long as preceding three segments united.

Pronotum with evenly *convex* disc and three antebasal foveae. Lateral foveae densely pubescent and about as large as the vertexal foveae. Median fovea unusual. It will be recalled that in *Reichenbachia* the median pronotal fovea is usually very much smaller than the lateral pronotal foveae. In *pluridentata* this median fovea is exceptionally large, about as large as the lateral foveae but quite shallow and nude. Pronotal base with integument covered sparsely with coarse, elongate punctures that give a substrate appearance to this region; basal margin slightly produced medianly to form an angulate outline.

Elytra with sloping humeri. Each elytron trifoventate; the sutural fovea at origin of a deep, entire sutural stria; intermediate fovea without a stria; humeral fovea at origin of a long discal stria that extends to within one-sixth of apical margin where it curves slightly mesiad; elytral flank simple. The three elytral foveae are all large, nude and penetrate the integument obliquely, so that their basal rims tend to be laminoid and this gives the impression of an interrupted foveal crest, apical of the true basal margin; none of the

Abdomen with five visible tergites and five visible sternites. First three tergites with narrow, well-formed lateral margins. First tergite about twice as long as second, bearing a pair of long, divergent basal abdominal carinae. These carinae are thirty-eight per cent as long as the first tergite, and are separated at bases by a transverse distance that exactly equals the maximum striaal interspace of the sutural elytral striae. Only the first three tergites are visible from a strictly dorsal view, the last two being subvertical. Venter with the lateral outline evenly concave, as is common for *Reichenbachia* males. First sternite medianly nearly as long as the remaining four segments united; second, third, and fourth sternites short, about half as long as the first sternite; fifth about two-thirds as long as first visible sternite, medianly longitudinally impressed, with an arcuate apical margin.

Prosternum not medianly bisected by a carina. Metasternum gently tumid on either side of a broad, shallow median impression; metacoxae well separated. Legs stout, with anterior and middle femora more inflated than posterior. Intermediate and posterior tibiae slightly arcuate. Intermediate trochanters each bearing a stout, short tooth at base of ventral face, and intermediate tibiae each armed with a long apical spur. Tarsi three-segmented and typical of genus. It should be noted that the single tarsal claw is narrowly and slightly bifid on the anterior tarsi.

The aedeagus of *pluridentata* is typical of *Reichenbachia* in general organization and was figured under this name elsewhere, but not designated as new and not described in detail (Park 1942, Pl. I, 2, 3). The aedeagus is relatively large, measuring 0.6 mm. long x 0.23 mm. wide. The median lobe is elongate oval from a dorsal view, with a basal diaphragm that has its basal margin semicircular and its apical margin trilobate. The lateral lobes are small but very distinct. The entire organ is similar in general to the aedeagus of oxyteline staphylinids as depicted by Blackwelder (1936).

Described on three males, the type and two paratypes in the collection of the author, who collected them in 1933 beneath pieces of moist log mold in Brownfield Woods, Urbana, Champaign County, Illinois, the paratypes on June 15 and 26, the type on August 3.

*Reichenbachia pluridentata* is a member of Group II of Raffray (1904) and of Group I of Casey (1897) and Bowman (1934). It is allied only to *atlantica* (Brendel), known from Louisiana to Florida along the Gulf Coast. The two species may be separated readily. *R. atlantica* has the occiput triangularly medianly impressed, the median pronotal fovea is very small and punctiform, and the intermediate elytral fovea is oblong. In addition to the prominent mandi-

fovea almost as large as the lateral foveae, and the intermediate elytral fovea is circular.

In very general organization, *pluridentata* is similar to the males of *rubicunda*, *kansasa*, and *ursina* with respect to the relatively large median pronotal fovea, prominent basal abdominal carinae, and the pubescence. From all of these *pluridentata* males are distinct as a consequence of the prominent mandibular spines, even larger median pronotal fovea, and very divergent and much more approximate basal abdominal carinae. The mandibular spines and toothed intermediate trochanters are probably secondary sex characters restricted to males.

#### *Decarthron rayi* new species (PI. IV)

*Type Male.* Body orange, legs and last antennal segment straw yellow. Pubescence erect, bristling, flavous, and conspicuous by reason of its length. For example, the abdominal pubescence is composed of setae that are 0.16 mm. in length. In other words, many of the setae are one-sixth as long as the body. Integuments shining, subimpunctate, save for the pronotal base (where the integument is coarsely punctate), and the elytra (where the integument bears rather coarse punctures). Length 1 mm.; width 0.5 mm.

Dorsal surface of head, not including eyes, narrowly trapezoidal, the sides being almost parallel; eyes exceptionally large, prominent, and very coarsely faceted, tempora short, one-third as long as eyes (about as long as two ocular facets). Top of head flattened, with simply rounded occiput, and flat vertex, a pair of vertexal foveae on a line almost through anterior third of eyes, these foveae nude, with a diameter of about one and a half ocular facets, and not connected to each other by a sulcus; antennal tubercles small, but prominent, with the front gently depressed between them. Frontoclypeus simple, subvertical. Labrum with apical margin slightly concave. Ventral surface of head with a deep fossa in anterior half, characteristic of the genus. In the present species, this fossa is seen to be open anteriorly where it abuts the submentum, and therefore, from another point of view, the ventral surface of the head has a Y-shaped carina in which the stem of the Y is the undivided gular carina, and the arms of the Y (that form sharp overhanging margins of the fossa) are the right and left gular-genal carinae of comparative anatomy. Maxillary palpi four-segmented; first minute; second arcuate, pedunculate, cylindrical in basal two-thirds and swollen in apical third; third transversely triangular, as wide as apex of second, with an angulate internal face and a convex external face, a long guard seta from the external face;

at the subacute apex. Antennae ten-segmented, simple; first segment subquadrate; second segment as long and as wide as the first (in dorsal view), suboval; third to seventh subequal in width and gradually decreasing in length; eighth slightly larger than seventh; ninth suddenly larger than eighth, transversely trapezoidal; tenth segment wider than ninth and about two times as long, with subacute apex and truncate base.

Pronotum with disc evenly convex and simple; three antebasal foveae, each fovea perforate, with a diameter of an ocular facet, but appearing much larger as it lies in a circular depression. Pronotum slightly more than half the elytral width.

Elytra with inconspicuous humeri; each elytron with two large basal foveae, each fovea nearly as wide as two ocular facets, nude; sutural fovea at origin of a deep, entire sutural stria; discal fovea at origin of a deep discal stria that extends for four-fifths of elytral length; elytral flank simple. Scutellum triangular and distinct. Mesothoracic wings iridescent, with the usual row of marginal alar setae.

Abdomen with five visible tergites and five visible sternites. First three tergites with narrow margins. First tergite very long, about as long as remainder of abdomen, with a pair of long, arcuate basal carinae. These carinae separated at base by forty-three per cent of total segmental width, separated at apex by fifty-one per cent of total segmental width, and exactly half as long as first segment. Last two tergites subvertical and not visible from above. Venter in two steps from a lateral view: the flattened first sternite nearly twice the length of the rest of the abdomen; second, third, and fourth sternites very short and together form the subvertical wall of the first step; the short fifth sternite forms the second step, and is oblique, medianly glabrous, with an arcuate apical margin. In the type the last tergite and last sternite are alightly retracted and the apex of the aedeagus is exserted. Base of first sternite heavily setose.

Prosternum short, not medianly carinated. Metasternum long, about three-fourths as long as first sternite; rather deeply and broadly sulcate medianly. Metacoxae separated by about half the metasternal length, the metasternum extending between coxae to cover the usually first visible sternite of non-brachyglutine pselaphids. Legs with trochanters not armed. Tarsi as for genus. Mesofemora moderately modified. Each mesofemur flattened at apical five-sixths in the lateromesial plane, this biconcave area divided dorsally by an oblique, carinoid fold, and in addition a very minute denticle set close to the oblique partition at the center of the sloping posterior face (Pl. IV. 2).



Described on one male, the type, in the collection of the author. This interesting species is named after its collector, Eugene Ray, who obtained it from log mold at Eddyville, Pope County, Illinois on May 5, 1934.

This *species* is allied to *abnorme* (LeConte) and *laurenticum* Casey. It can be quickly separated from both. The lateral pronotal foveae are obsolete in these two but large and obvious in *rayi*. The pubescence is dark brown in *abnorme*, opaque brownish-black in *laurenticum* and hyaline in *rayi*.

#### TYCHINI

#### *Tychus daggyi* new species (Pl. V)

*Type Female.* Body yellow orange with legs, antennal club and maxillary palpi yellow. Pubescence long, sparse, semiappressed. In addition to this general body pubescence, each tibia is provided with a single peculiar guard seta (Pl. V, 2). These setae are discussed later. Integuments polished and minutely punctulate. Length 1.5 mm.; greatest width 0.60 mm.

Head elongate suboval. Eyes vestigial, consisting of four facets each. As a consequence of the vestigial eyes, the tempora are very prominent, nearly half as long as head, gradually narrower to the transversely sulcate cervicum. Occiput simple, gently convex. Vertex simple, slightly convex; postfrontal spicules distinct, located halfway between antennal tubercles and vertexal foveae; vertexal foveae small, nude, clearly visible from a dorsal view, and each fovea about as large as a spicule. Antennal tubercles prominent, with the bisecting sulcus not well formed so that the impression is that of a single, undivided tubercle. Face very narrow, reduced to a vertical strip between the large antennal cavities; these cavities mesially separated by the usual hyaline interantennal diaphragm or "window." Clypeus simple. Labrum very transverse, nearly as wide as clypeus, with a truncate apical margin. Mandibles strong, with long rami, the right crossed dorsal to left. Ventral surface of head with a small but distinct, blackened tubercle medianly placed just posterior of the submentum.

Maxillary palpi large and conspicuous; first segment small and subcylindrical; second glabrous, arcuate pedunculate, gradually swollen in apical third; third densely pubescent, in the form of a rounded right triangle, with almost straight external face and angulate internal face, this segment six-sevenths as long as second segment; fourth densely pubescent, with an almost straight external face and a broadly rounded internal face, as wide as maximum width of third but one-fourth longer, with a peduncular articulation to third segment, and a conspicuous, oblique palpal cone. Antennae eleven-segmented; first segment slightly elongate; second elongate oval; third briefly obconical; fourth to eighth as wide as third, transverse, moniliform; prominent antennal

club of last three segments, the club as long as segments three to eight inclusive; ninth submoniliform, twice as long and twice as wide as eighth; tenth submoniliform, slightly wider than ninth; eleventh slightly wider than tenth, longer than preceding two united.

Pronotum rounded-hexagonal; simple, convex disc; a lateral antebasal fovea each side, and a row of five foveae at base, giving the impression of an almost transverse row of seven foveae. The lateral antebasal foveae are deep, oval and pubescent; the five basal foveae are nude and the median of these is larger.

Elytra with rounded humeri; each elytron with two large, deep, nude basal foveae; sutural fovea at origin of an entire sutural stria; discal fovea at origin of a discal stria that extends through basal half; elytral flanks simple. Mesothoracic wings present.

Abdomen with five visible tergites and six visible sternites. Narrow lateral margins on first three tergites. Basal abdominal carinae not present as such, but indicated by a pair of brownish tubercles at base of first segment, separated by half the width of the segment. Venter simple, with the slightly convex outline, from a lateral view, typical of females; second to sixth segments decreasing progressively in length; second as long as the next three united; sixth slightly shorter than fifth and perfectly simple.

Prosternum setose, not bisected by a carina. Metasternum simply tumid. Legs slender, unarmed, and simple with one remarkable exception, as follows.

It is noteworthy that in *daggyi* each tibia bears a coiled guard seta at the basal third of the external face. These setae are conspicuous, about one-third as long as the tibia, and their isolated position and structure tempts one to theorize regarding the ecology of the species. The vestigial eyes in conjunction with the development of what appear to be tactile setae suggest that these beetles lead at least a partially subterranean life, possible in deep leaf mold or soil. Certain of the cavernicolous carabid beetles appear to parallel this pselaphid in that they lack eyes and have prominent guard setae on various portions of the body, and there are similar parallel situations in other genera of pselaphids.

Described on one female, the type, collected by Dr. Tom Daggy, from a berlesed leaf mold sample in Egg Rock Woods, Cabarrus County, North Carolina on February 11, 1949.

This strange species is not placed too satisfactorily but appears to have more in common with *Tychus* than related genera. It has the vertexal foveae of *Tychus* but the ratio in length of the last two maxillary palpal segments is that of *Cylindrartus*.

The new species is differentiated easily from the described species in both of these genera. In *Tychus*, *daggyi* and *microphthalmus* are the only two known with vestigial eyes and *microphthalmus* is known only from a male with eight ocular facets and was collected in Canon City, Colorado (Brendel, 1893). The species known east of the Rocky Mountains have females in which the coiled guard setae are absent and the eyes are well developed. In *Cylindrartus*, *daggyi* is comparable only to *longipalpis* since the internal face of the third segment of the maxillary palpi in these two species is strongly and sharply angulated, but *longipalpis* lacks the tibial guard setae and both sexes have prominent eyes. The third segment of the maxillary palpus in *daggyi* is heavily setose, as usual in the genus, and the tips of the setae appear thicker at high magnifications. It can not be decided whether these apical enlargements are capitulations or whether the ends of the setae curl sharply, and the solution of this problem must await more material that can be prepared for examination with the compound microscope. Finally, it will be noted that the length ratio of the second and third tarsal claws varies as between the pairs of legs. That is, the posterior tarsi have the second tarsomere slightly longer than the third, whereas the intermediate and anterior tarsi have the second tarsomere distinctly shorter than the third. The first of the conditions is usually thought of as typical of *Tychus*; the second of these conditions is usually thought of as typical of *Cylindrartus*.

#### TYRINI: REVISION OF THE GENUS *CEDIUS*

The genus *Cedius* was erected by John L. LeConte (1850, p. 74) for two species, *ziegleri* and *spinosus*. LeConte and Horn (1883, p. 87) integrated this genus with other American genera of the family, and Brendel and Wickham (1890, p. 228-230, pl. VI, fig. 10, 11, 11a) redescribed and illustrated LeConte's species. Thomas L. Casey subsequently added a third species, *robustus*, redefined the genus, and gave a key to the three species (1897, p. 626). Later, Charles W. Leng (1920, p. 132) followed Casey's arrangement, and John R. Bowman (1934, p. 132-133) utilized Casey's key in differentiating the three species, and also designated *spinosus* (p. 144) as the genotype of *Cedius*.

The present revision includes the following. (1) A discussion of the comparative morphology of the genus. (2) The comparative morphology of the known species. (3) Secondary structural differences between the sexes. This is necessary since one of the peculiarities of the species is that the females have the spines on the anterior legs even better developed than in the males. This exceptional situation in pselaphids may have contributed to Casey's misunderstanding with regard to sex in *Cedius*, since he applied the

female sternite structure to what was in reality the male (1897, p. 625). (4) Subgenera of *Cedius*. Considerable attention has been paid to the aedeagus and it has been found that the known species are separable into two radically different groups on the basis of the structural plan of the aedeagus and the direction of exertion of the penial plate. This required the erection of a new subgenus. (5) A key to both sexes of the known species is provided. (6) A new species is described. (7) What appears to be a new sex-linked variety is described.

The present revision has been contemplated for the past sixteen years, and was initiated in August, 1934, when the author collected two specimens of a new species of *Cedius* in northern Indiana. In the course of the investigation the types of the three previously known species have been studied. To this end, the author is indebted to Dr. E. A. Chapin and Dr. R. E. Blackwelder of the U. S. National Museum for permission to study the type of *robustus*; and to Dr. J. C. Bequaert of the Museum of Comparative Zoology for permission to study the types of *ziegleri* and *spinosus*.

#### COMPARATIVE MORPHOLOGY OF THE GENUS

In this section, generalizations concerning anatomy are understood to refer to both sexes where they are known. This is a genus of relatively large pselaphids, the species ranging from 1.7 mm. to 2.7 mm. in length.

In death the general body tone is a light reddish brown. The pubescence is golden yellow, semiappressed and moderately long and abundant. Integuments polished and subimpunctate except for the elytra and tergites where the punctures are distinct.

Head trapezoidal; eyes prominent in lateral view, subreniform and set at their own depth from the flattened vertex; a distinct infraocular spine extends obliquely from the posterior angle of each eye; tempora very deep and about as long as an eye. Dorsal surface of head with three lightly pubescent foveae. These are a pair of vertexal foveae set on a line through eye centers, and a frontal fovea at base of a longitudinal frontal sinus that separates the antennal tubercles; vertexal foveae are placed near the ocular declivity, so that their orifices are slightly oblique, and not fully visible from above. Laterally, the apical margin of the clypeus extends posteriorly to the anterior eye margin as a carinoid ridge. Genal beard well developed, the setae extending from occiput, posterior eye margin and infraocular spine. Maxillary palpi four-segmented; first segment minute; second strongly arcuate to almost semi-circular, gradually tumid from pedunculate base; third very transverse, about twice as wide as long and transversely conical, with a short and convex ex-

ternal face and the internal face formed as a long spinoid process; fourth *segment* actually almost twice as long as third, but only half as wide. The long concave face of the fourth segment is subparallel to the great width of the third segment, so that on casual inspection, the third and fourth segments appear to have the same length and width. Labrum short, transverse, and just discernibly denticulate at center of apical margin. Mandibles strong, with two to three secondary teeth. Ventral surface of head simple, flattened, with a large gular fovea at base; ventroanterior genal margin erected into a high, laminoid and translucent ridge that partially encloses the maxillary cardo. Antennae eleven-segmented, with an abnormal club in both sexes; first seven segments slightly elongate and subequal in width; eighth with the ventral face apically produced as a conspicuous spinoid process (Pl. VII, 1-5).

Pronotum rounded-hexagonal, widest anterior to middle, basal margin much wider than apical; disc strongly convex, simple; an almost transverse row of three antebasal foveae connected by a deep transverse sulcus.

Elytra with prominent, rounded humeri; each elytron with two large, perforate, almost nude basal foveae; sutural fovea at origin of a deep, entire sutural stria; discal fovea at origin of a discal stria to about apical three-fourths; elytral flank simple, lacking subhumeral fovea.

Mesothoracic wings well developed, their margins fringed with alar setae.

Abdomen with five visible tergites, the lateral margins strongly formed on the first four; first tergite with a pair of basal abdominal carinae that are separated by at least one-third of the segmental width and are at least one-fourth of the segmental length; base of first tergite obliquely depressed, this depression supporting a prominent, blackened, pyramidal tubercle at center of apical margin of depression; fifth tergite sharply set off from fourth by a deep, transverse sinus at base of fifth segment.

Metasternum medianly sulcate; legs relatively thick; tarsi three-segmented, the first segment very short and inconspicuous, second elongate, and third twice as long as second and bearing a pair of strong, equally long, divergent tarsal claws; one of these claws *is* slightly thinner than the other.

#### COMPARATIVE MORPHOLOGY OF THE KNOWN SPECIES

Although *the* two sexes do not differ appreciably in size, there is a differential in average size *as* between the species populations. For example, the average for *ziegleri* is 2.5 mm. long x 1.0 mm. wide; *cruralis* 1.86 mm. x 0.86 mm.; *spinus* 1.75 mm. x 0.74 mm. *Cedius robustus*, known only from the male type (USNM Type No. 38760), measures 2.5 mm. in length. These averages were taken with an ocular micrometer for between four to twenty

specimens for each species. They are slightly lower values than usually assigned to the species listed since the measurements in length were across the natural arc of the body rather than measuring each part separately. For example, *ziegleri* measured in the latter way may be as long as 2.8 mm.

There is a differential in ocular facets: both sexes of *ziegleri* have about fifty facets per eye; male *robustus*, about fifty; both sexes of *spinosus*, about forty-six facets; male *cruralis*, about forty-six facets.

Occiput is evenly convex in *ziegleri* and *robustus*; slightly concave medianly in *cruralis*; distinctly sulcoid in *spinosus*, to such an extent that the occiput is divided into a right and left occipital tumidity.

Labrum in *ziegleri*, *robustus*, and *spinosus* very transverse, being about four times as wide, whereas in *cruralis* the labrum is three times as wide as long.

Maxillary palpi are short and massive in *ziegleri*; third segment in the form of a tumid cone, the height of which (in reality the segmental width) is about three-fifths the length of the fourth segment; fourth segment distinctly oviform. In *spinosus* and *cruralis* the maxillary palpi are relatively slender; third segment in the form of an elongate, acute cone, the height of which almost equals the length of the fourth segment; fourth segment elongate oval, with straight internal face and gently convex external face.

The eighth antennal segment has the apical spine relatively short and thick in *ziegleri* and *robustus*, this spinoid process not extending beyond the apical margin of the ninth antennal segment (Pl. VII, 4, 5). Furthermore, in *ziegleri* the relatively thick antennal club has the eleventh segment only slightly more than twice as wide as long, whereas in *robustus* the antennal club, is relatively slender, the eleventh segment being almost three times as long as wide. In *spinosus* and *cruralis* the spine of the eighth antennal segment is relatively long, extending nearly to the apical margin of the tenth antennal segment (Pl. VII, 1, 3).

The spine of the eighth antennal segment is bilaterally symmetrical in *spinosus*, but is bilaterally asymmetrical in *cruralis* (Pl. VII, 2), the spinoid process extending from the lateroventral face and with the mesioventral face tending to be secondarily subtuberculate. Furthermore, this spine is conical and narrows regularly to an acute tip in *spinosus* whereas in *cruralis* this spine is laminoid and apically sharply truncate. Antennal club as illustrated.

In all of the species the pronotal disc is strongly convex but in *cruralis* the disc is gibbous.

The discal elytral stria in *ziegleri* and *cruralis* is much broader and more indistinct than in *spinosus*.

In *ziegleri* the body is widest through the first tergite, but in *spinosus* and *cruralis* the body is widest through the elytra. The basal abdominal

carinae of the first tergite are separated by about one-third of the segmental width, and are slightly more than one-third the segmental length in *ziegleri*; in *spinosus* these carinae are separated by almost one-half the segmental width, and are nearly one-third the segmental length; in *cruralis* these carinae are separated by almost one-half the segmental width, and are relatively short, being about one-fourth the segmental length. In both sexes of *ziegleri* and *spinosus* the fifth tergite is conical, whereas in *cruralis* males this tergite is evenly convex and trapezoidal in outline.

#### SECONDARY STRUCTURAL DIFFERENCES BETWEEN THE SEXES

The secondary structural differences between the species of *Cedius* have complicated to a certain extent a proper understanding of the problems in the genus. As noted previously, an exceptional situation for pselaphids is involved in that the females, where known, have a sulcoid metasternum, the antennal club and abnormal eighth antennal segment are formed as in males, and the spines of the anterior legs are even larger than in the males.

Sex always can be readily and surely established by an examination of the sternites. Females have six visible sternites, the last of which has the median third of the apical margin produced in a semicircular lobe that is coadapted to a semicircular arcuation of the median third of the apical margin of the fifth tergite (Pl. VII, 11). Males have seven visible sternites, the last of which is in the form of a small circular to transversely oval penial plate that is coadapted to a semicircular arcuation of the center of the apical margin of the sixth sternite and to a similar arcuation of the apical margin of the fifth tergite (Pl. VII, 10). This additional male sternite is fitted so closely, in repose, that good illumination and magnification may be necessary to demonstrate its presence and hence sex discrimination must be done with care. This difficulty may be obviated if specimens are killed in a weak concentration of ether and carbontetrachloride gas since this treatment often causes the males to exert partially or wholly both penial plate and aedeagus.

Male *ziegleri* have the clypeus strongly and medianly produced in a prominent clypeal tubercle (Pl. VII, 7); female *ziegleri* lack the tubercle and have the clypeus simple and gently declivous and convex (Pl. VII, 8); male *spinosus* have the clypeus simple and gently declivous; female *spinosus* have the clypeus simple and moderately declivous; male *cruralis* have a clypeus that is intermediate between that of male *spinosus* and male *ziegleri* in that the clypeus has a minute tuberculoid swelling. The face as a whole is very strongly excavated in male *ziegleri* (Pl. VII, 7), moderately so in male *cruralis* (Pl. VII, 9), very slightly excavated in both sexes of *spinosus* (Pl. VII, 6), and simply declivous in female *ziegleri* (Pl. VII, 8).

Metasternum is medianly sulcoid in both sexes, but this is broad and shallow in females, and relatively deeper in males. In *cruralis* males the metasternal depression is exceptionally deep, with correspondingly prominent lateral tumidities.

Anterior trochanter always spined in both sexes. There is a single conical spine at center of the trochanter's ventral face in *ziegleri*, *robustus* and *spinosus* (Pl. VIII, 7, 9). The anterior trochanter is unique in *cruralis*, the males having this segment bispinose (Pl. VIII, 12); that is, there is the usual long conical spine and a short, triangular spine between the long spine and the trochantal base.

Mesotrochanter simple, with the ventral face thin and evenly convex in outline in both sexes of *ziegleri*, *spinosus* and male *robustus* (Pl. VIII, 8, 13). In *cruralis* males the mesotrochanter is unique and diagnostic, the ventral face suddenly produced into a conspicuous, laminoid, subquadrate plate (Pl. VIII, 14).

Metatrochanter of both sexes of *ziegleri*, *spinosus* and male *robustus* has a thin, simple ventral face. In *cruralis* males the ventral face of this segment is triangularly produced with an acute apex (Pl. VIII, 15).

The anterior femora are thicker in males than in females, but are spined in both sexes. Furthermore, the femoral spines are larger in females than in males, where both sexes are known. This is exceptional in pselaphids. In male *robustus*, male *cruralis* (Pl. VIII, 12), both sexes of *ziegleri* (Pl. VIII, 7), female *spinosus* (Pl. VIII, 11) the anterior femur is bispinose, a conical spine at the base and a second conical spine at basal third. Male *spinosus* are dimorphic. Typical males have the more distal spine represented by a minute tooth (Pl. VIII, 10); atypical males of what appears to be a new, sex-linked variety have the distal spine wholly absent (Pl. VIII, 16).

#### SUBGENERA OF *CEDIUS*

Early in the present study of *Cedius* it became apparent that exact information on the sex of specimens was essential to a proper understanding of the taxonomy of the genus. The aedeagi of *ziegleri*, *spinosus*, and *cruralis* were examined with care and it was found that the genus is divisible into two disparate groups of species of subgeneric rank.

The aedeagus of *Cedius* is large and elongate. This organ in *ziegleri* measures 0.502 x 0.167 mm.; in *spinosus*, 0.361 x 0.124 mm.; and in *cruralis*, 0.335 x 0.134 mm. In these three species (the aedeagus of *robustus* has not been seen), the median lobe has two conspicuous diaphragms on the morphological dorsal surface, a large subcircular basal diaphragm and a smaller sub-



oval apical diaphragm. The apical portion of the latter bears an aperture or fenestration. These two diaphragms lie in the basal two-thirds of the aedeagus; the apical third is a narrow strip of sclerotized cuticle that bears the microscopic apical duct. This duct continues to the apex of the aedeagus. Notably, this apical portion is asymmetrical. This asymmetry takes the form of a sharp turn to either the right or left in the plane of the long axis of the dorsal lobe. This asymmetry is species specific, and can be appreciated by examination of Plate VIII. These illustrations have been adapted from Park (1942, Pl. III, fig. 7, 8, 9).

It will be remembered that the aedeagus in most if not all beetles is rather closely coadapted to the copulatory bursa and associated structures of females within a given population. In *Cedius* it is probable that cross-fertilization between species would be very unlikely indeed. Consequently, where one group of species was found to have aedeageal asymmetry to the right, and another group with aedeageal asymmetry to the left, it is reasonable to assume that such structural divergence represents a fundamental evolutionary cleavage of subgeneric rank.

In support of this aedeageal asymmetry, the seventh sternite or penial plate is exerted at copulation either to the right or to the left in harmony with the direction of the apex of the median lobe. That is, where this apex is angulated to the right the penial plate is exerted to the right, and conversely, where the aedeageal apex is turned to the left, the penial plate is exerted to the left. Furthermore, the exertion of the penial plate is a movement designed to swing this structure laterodorsally, out of the way of the exerted aedeagus and hence penial plate muscles are involved that are so inserted that they contract either to the right or to the left, as the *case may* be.

Bowman (1934, p. 144) designated *Cedius spinosus* LeConte as the genotype. Therefore, this species becomes the type of the subgenus *Cedius*, and the latter is characterized by populations the males of which have aedeageal and penial plate asymmetry to the morphological right side. (It must be remembered that when the aedeagus is exerted it lies with its long axis parallel to the long axis of the body, and with its apex directed anteriorly, but with its ventral surface in contact with the ventral surface of the abdomen. Consequently, when the aedeagus is examined from the ventral view, the morphological dorsal surface of the aedeagus is uppermost to the observer. This, in turn, means that if the aedeageal asymmetry is to the morphological left, the apex will appear to be asymmetrical to the observer's right.) With this in mind

*Cedius, sensu strictiore*

Species populations the males of which have an aedeagus with the apical diaphragm bearing a minute, pore-like aperture, apex of median lobe strongly arcuate to the morphological right; penial plate exerted to the morphological right (Pl. VIII, 4).

Composition:

***I. Cedius spinosus* LeConte (1850, p. 75)**

*Published records:* South Carolina (LeConte, 1850), Ohio (Dury, 1903, 1908), Indiana (Blatchley, 1910), Pennsylvania (Leng, 1920), New York (Leonard, 1928), Illinois and Indiana (Park, 1935), North Carolina (Brimley, 1942).

*Material examined:* Type Specimen (MCZ Type No. 6119), South Carolina; Rockville, Pennsylvania (USNM). Author's collection: New York (Long Island); New Jersey (Middlesex); Illinois (Cook); Maryland (Prince Georges); Kentucky (Powell); Tennessee.

a. *spinosus spinosus* LeConte

b. *spinosus obsoletus* new variety

***Sinistrocedius*, new subgenus**

Species populations the males of which have an aedeagus with the apical diaphragm bearing a large aperture that covers as much as one-third of the membrane area, apex of median lobe strongly arcuate to the morphological left; penial plate exerted to the morphological left (Pl. VIII, 1, 2).

Composition:

***2. Cedius zieglerei* LeConte (1850, p. 74)**

*Published records:* Pennsylvania (LeConte, 1850), Pennsylvania (McCook, 1877), Ohio (Duty, 1903, 1908), Indiana (Blatchley, 1910), Pennsylvania, Ohio, Indiana, Iowa and Missouri (Leng, 1920), New York (Leonard, 1928), Mississippi valley north of Missouri (Bowman, 1934).

*Material examined:* Type Specimen (MCZ Type No. 6118), Pennsylvania; Washington, D. C. (USNM). Author's collection: Massachusetts (Middlesex); New York (Rockland); New Jersey (Essex); Rockville, Pennsylvania; Washington, D. C.

***3. Cedius robustus* Casey (1897, p. 626)**

*Published records:* Washington, D. C. (Casey, 1897; Leng, 1920; Bowman, 1934). *Material examined:* Type Specimen (USNM Type No. 38760), District of Columbia.

***4. Cedius cruralis* new species**

*Material examined:* Type and four paratypes. Michigan (Berrien); Indiana (LaPorte); Illinois (Champaign)

- 1      Seven sternites visible, the seventh in the form of a small, oval to  
circular penial plate, MALES, (Pl. VII, 10) 2  
Six sternites visible, the sixth with apical margin medianly produced into a  
rounded lobe, FEMALES, (Pl. VII, 11) 6
- 2 (1) Spine of eighth antennal segment relatively short, not extending beyond  
apical margin of ninth antennal segment; clypeus with a conspicuous  
median tubercle (Pl. VII, 4, 7) 3  
Spine of eighth antennal segment relatively long, extending to apical  
margin of tenth antennal segment; clypeus not having a con-  
spicuous median tubercle (Pl. VII, 1, 3, 6, 9) 4
- 3 (2) Antennal club relatively slender, the eleventh segment nearly three  
times as long as wide *robustus* Casey.  
Antennal club relatively thick, the eleventh antennal segment only  
very slightly more than twice as long as wide *zeigleri* LeConte.
- 4 (2) Mesotrochanter with ventral face suddenly produced into a con-  
spicuous, laminoid, subquadrate plate (Pl. VIII, 14) *cruralis* new species.  
Mesotrochanter with ventral face simple 5
- 5 (4) Profemur with a conical basal spine and a minute denticle at basal  
third of length (Pl. VIII, 10) *spinosus spinosus* LeConte.  
Profemur with a conical basal spine but the denticle at basal third  
absent, the surface perfectly smooth *spinosus obsoletus* new variety.
- 6 (1) Spine of eighth antennal segment relatively short, not extending  
beyond apical margin of ninth segment (Pl. VII, 4) *ziegleri* LeConte.  
Spine of eighth antennal segment relatively long, extending to api-  
cal margin of tenth antennal segment (Pl. VII, 3) *spinosus* LeConte.

*Cedius cruralis* **new species** (Pl. VI, VII, VIII).

*Type Mate.* In life, the general body color is yellow-brown with the elytra having a distinct pinkish cast and maxillary palpi and tarsi yellow; in specimens mounted for fifteen years the elytra lose their pinkish cast and the general body color is yellowish-brown with the brown predominating. This color comparison between living and dead material was made at the same time and at the same magnification and illumination. The antennal club, maxillary palpi, tarsi and distal half of tibiae yellow in mounted specimens. The pubescence in both living and dead specimens is golden yellow, conspicuous, semierect and moderately long. Integuments shining, head and pronotum subimpunctate; elytra, tergites and femora obviously punctate. Length 1.97 mm.; greatest width (through elytra), 0.9 mm.

In addition to the generic anatomy alluded to previously, *cruralis* has the following diagnostic or peculiar features. The eyes have about 46 facets. Occiput only slightly concave medianly. Facial profile intermediate between that of the male *ziegleri* (where it is deeply excavated) and *spinosus* (where it is very slightly impressed). Clypeus intermediate, having a weak transversely tuberculoid swelling that is in sharp contrast to the prominent clypeal tubercle of male *ziegleri* and *robustus* and the perfectly simple clypeus of male *spinosus*. Maxillary palpi relatively slender, with third segment in the form of an elongate acute cone, the height of which (segmental width) almost equals the length of the fourth segment; fourth segment elongate oval, with almost straight internal and gently convex external face. Labrum three times as wide as long. Spine of ventral face of eighth antennal segment relatively long, extending to apical margin of tenth antennal segment, this spine peculiar, laminoid, and apically sharply truncate (Pl. VII, 1). The spine in *spinosus* is as long, but is acute, conical and bilaterally symmetrical. From a ventral view of the antennal club (Pl. VII, 2), the eighth segment of *cruralis* is seen to be asymmetrical, with the spine arising from the lateroventral face and the mesioventral face is also produced into a small tuberculoid process. Pronotal disc much more gibbous than in other species of the genus. Basal abdominal carinae of first tergite relatively short for the genus, convergent, one-fourth the segmental length and separated by one-half the segmental width. Fifth tergite evenly convex and trapezoidal in outline, not conically produced as in the other species. Metasternum deeply impressed in median half, this impression exceptionally wide and deep with rather sharply formed lateral walls that are correspondingly tumid. Each anterior trochanter bispinose, with a long conical spine at center of ventral face and a short, triangular tooth between this spine and base of trochanter; each anterior femur bispinose, with a long conical spine at basal seventh and a second shorter but well-formed

conical spine at basal third (Pl. VIII, 12). This quadrispinose anterior leg is unique in the genus. Middle trochanters each with the ventral face suddenly produced into a prominent, laminoid, subquadrate plate (Pl. VIII, 14) that is unique in the genus. Posterior trochanters each with the ventral face evenly produced into a triangular outline with acute apex. Aedeagus unique, 0.335 mm. long and 0.134 mm. wide, of the *Sinistrocedius* type, but with the apex of the median lobe broadly and bluntly rounded (Pl. VIII, 2, 3) in contrast to the very acute apex of this organ in *ziegleri* (Pl. VIII, 1).

This species was named *cruralis* and the aedeagus illustrated (Park, 1942, pl. III, fig. 9), but not designated as new and not further described at that time.

This new species is described on five males, the type and four paratypes. The type and one paratype were collected by the author in the nest of *Aphaenogaster tennesseensis* Mayr (host ant identified by Dr. M. R. Smith, U. S. Bureau of Entomology) in a decaying sugar maple log in Davis Woods (this forest described by Park and Strohecker, 1936), near Smith, LaPorte County, Indiana on August 18, 1934. One paratype collected by W. S. Snow from a tree hole at Urbana, Champaign County, Illinois. Two paratypes collected by the author's daughter and himself in the nest of *Aphaenogaster tennesseensis* Mayr in a decaying sugar maple stump in Warrens Woods, near Lakeside, Berrien County, Michigan on July 30, 1949. One paratype in the collection of W. S. Snow, type and three paratypes in the author's collection.

The new species is certainly myrmecophilous, and may be an habitual synoekete of *Aphaenogaster*. The related *Cedius ziegleri* is a well known inquiline and has been reported with *Formica rufa* (McCook, 1877), with *Formica integra* and *Formica exsectoides* (Schwarz, 1890), *Formica integra* (Blatchley, 1910) and *Formica exsectoides* (Leonard, 1928) and may be expected with *Formica ulkei* in the Chicago Area. Furthermore, the behavior of *cruralis* and *spinosus* with their hosts (Park and Corley \*) suggests a high degree of adjustment. The probability, therefore, is that the tree hole habitat at Urbana may have included *Aphaenogaster* nesting in the tree. In an intensive study of pselaphids living in tree holes (Park, Auerbach and Corley t) no tyrine genera have appeared in the Berlese samples. On the other hand, *Cedius spinosus* has been collected repeatedly in pine logs in Maryland. It may be that species of *Cedius* are facultative synoeketes of ants, as is known for *Batrissodes globosus* (Park, 1947).

\*Park, Orlando and Glenna Corley, "Observations on the behavior of pselaphid beetles of the genus *Cedius*," 1950, in preparation.

tSee footnote, p. 321.

*Cedius spinosus obsoletus* new variety

In the course of this revision, it became clear that the females of *spinosus* always have the two spines of the anterior femur strongly developed. The males, on the other hand, have the more basal of these two spines consistently smaller than in the female, and the distal spine is either very short or completely absent. At first, it was thought that this differential in the distal spine might represent a variable condition in minuteness. Later, as more material accumulated, it was found that the males are dimorphic, the distal spine either being present or absent. Since complete absence of this spine is restricted to males, it may be that this is a sex-linked character. The LeConte type of *spinosus* is a male (MCZ Type No. 6119) in which the distal of the two femoral spines is present in the typical minute, denticulate form. The condition in which this spine is absent, and at high magnification and illumination the surface of the femora at this point is perfectly smooth and evenly convex, is designated as a new variety, *obsoletus*.

The frequency of the new variety is about one in three. For example, out of fifteen males examined for this feature, ten had the spine in question and five lacked the spine.

It is apparent that *obsoletus* does not represent a new subspecies since these five specimens were distributed over the range of the species, from New York to Illinois. In the case of the Illinois record, both *spinosus spinosus* and *spinosus obsoletus* were taken in the same ant nest.

The records for *obsoletus* in the author's collection are Massapequa, Nassau County, New York; Jamesburg, Middlesex County, New Jersey; Willow Springs, Cook County, Illinois; Palos Park, Cook County, Illinois in the nest of *Aphaenogaster tennesseensis* Mayr, and previously reported (Park, 1935) from the same locality in the nest of *Lasius aphidicola* Walsh.

## ABSTRACT

Six hitherto undescribed species of pselaphid beetles are reported for the Nearctic Region. These are *Bythinoplectus gloydi* (Arizona), *Trimiopectus auerbachii* (Michigan and Illinois), *Reichenbachia pluridentata* (Illinois), *Decarthron rayi* (Illinois), *Tychus daggyi* (North Carolina), and *Cedius cruralis* (Indiana, Illinois and Michigan). These new species are illustrated.

A new, apparently sex-linked, variety is described: *Cedius spinosus obsoletus*.

*Bythinoplectus gloydi* belongs to a tribe hitherto unreported for the Nearctic Region and the zoogeographic implications of this record are briefly indicated.

The genus *Cedius* is revised. This revision includes (1) a discussion of the general morphology of the genus; (2) the comparative morphology of the species; (3) the structural differences between the sexes; (4) the subgenera of the genus, based on the anatomy of the aedeagus and the direction of exertion of the penial plate, including the erection of a new subgenus, *Sinistrocedius*; (5) a key to the species, based on both sexes where known; (6) description of a new species and a new variety, as noted previously.

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Errata:

Page 321, paragraph 5, line 3, read " .... relatively abundant ... .

Page 325, liue 4, read " .... *kansana* .... "

## **PLATES I - VIII**

These plates have been drawn by Miss Marie Wilson, an experienced illustrator of this family of beetles, and under the constant supervision of the author. The routine was as follows: a typical specimen was selected, and its structural features observed at 70 diameters. In this preliminary conference the range in variation of structure in the population was noted and "key characters" checked. Then the artist drew the beetle by means of a reticule in one of the oculars of the dissecting binocular, transferring the detail seen under each reticule square to a square of a sheet of graph paper. The completed drawing was then gone over by the author, and checked or altered by the artist. The approved drawing was then transferred to drawing paper by means of an illuminated glass-topped drawing table. This drawing was then inked, and the finished plate checked again by the author. Each plate required about twenty hours.

PLATE I

*Bythinoplectus gloydi* new species

1. dorsal aspect, female.

2. lateral aspect of head, female

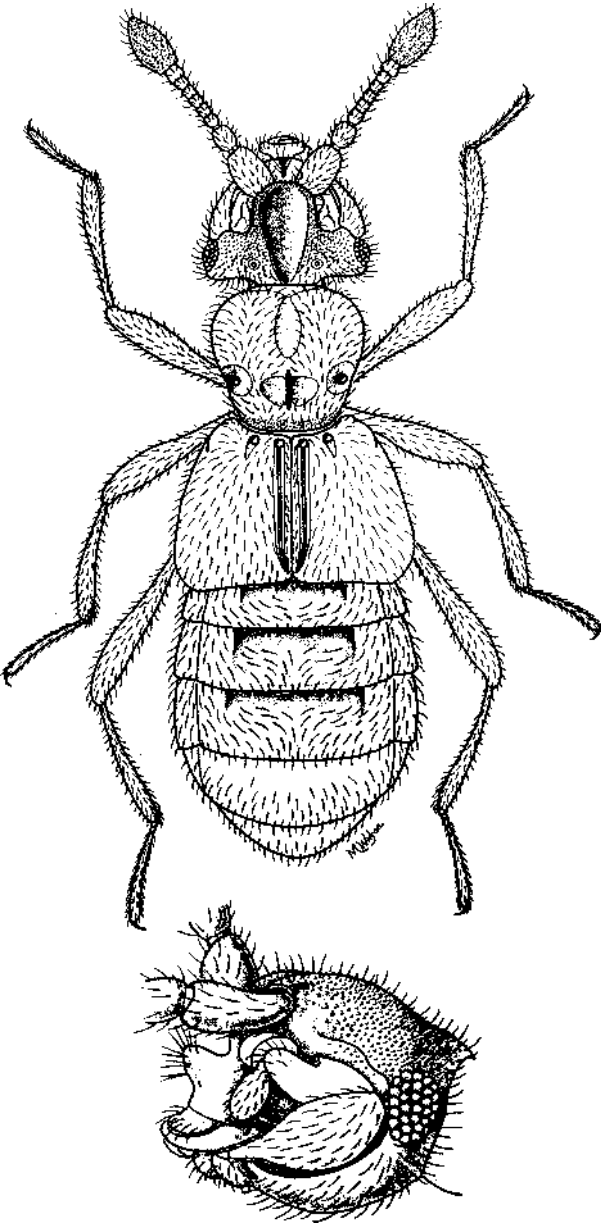
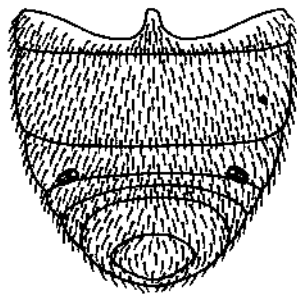
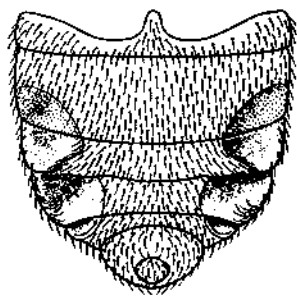
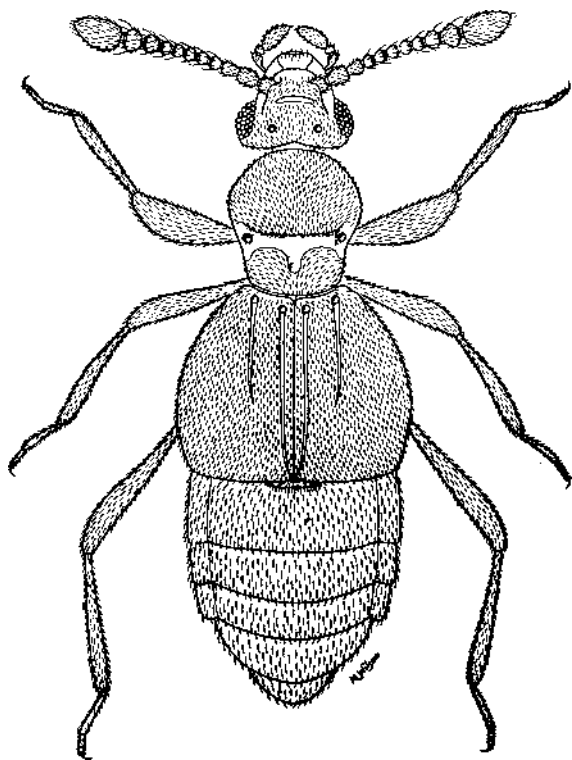


PLATE II

1. *Trimiopectus auerbachii* new species, dorsal aspect.
2. Venter of *T. obsoletus* Brendel, male (lower right) .
3. Venter of *T. auerbachii* new species, male (lower left) .

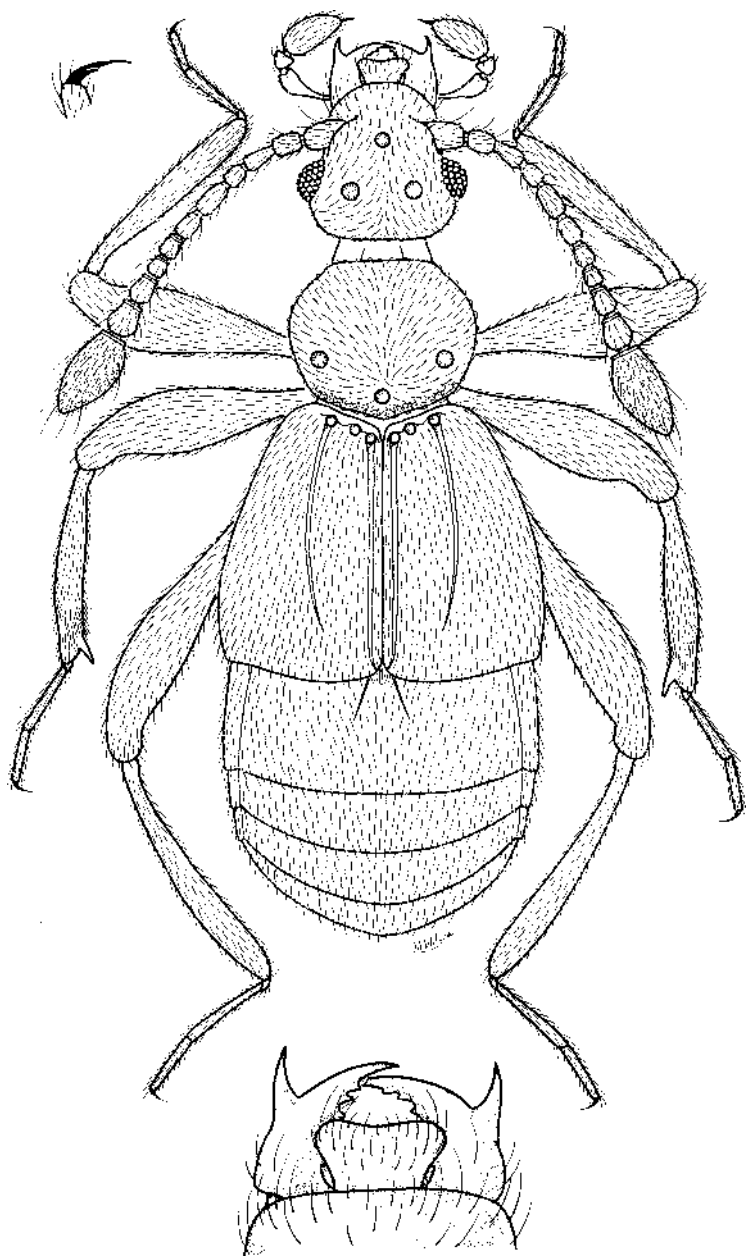


**PLATE III**

*Reichenbachia pluridentata* new species

1. dorsal aspect, male
2. detail of mandibles
3. bifid claw of anterior tarsus (upper left)





**PLATE IV**

*Decarthron rayi* new species

1. dorsal aspect, male
2. mesothoracic femur, male

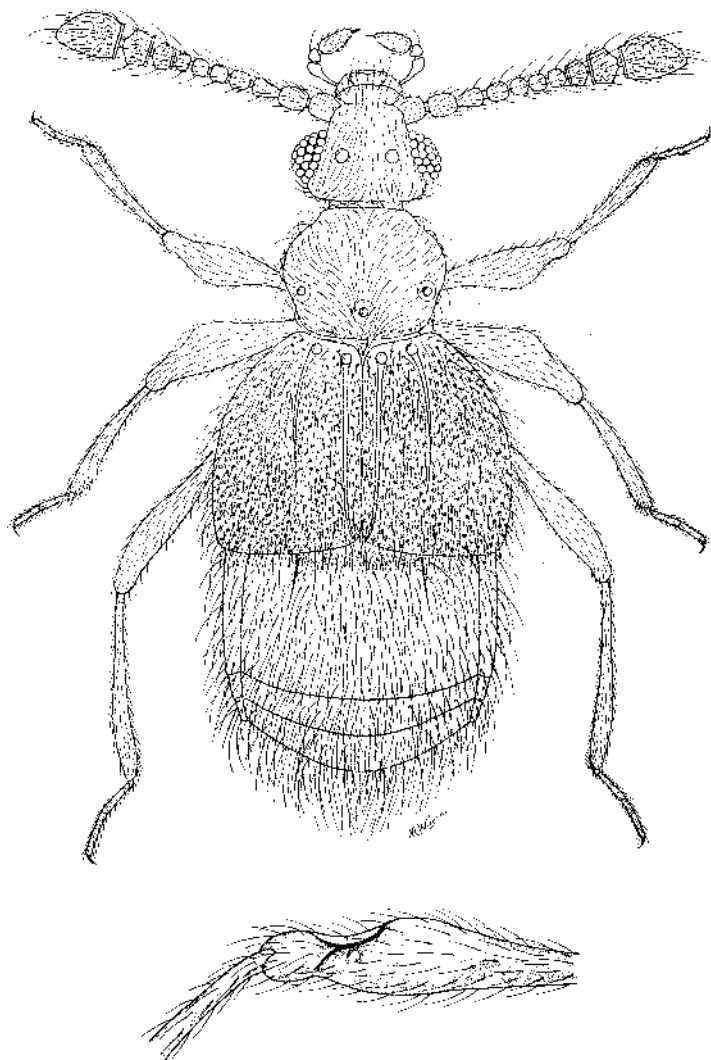
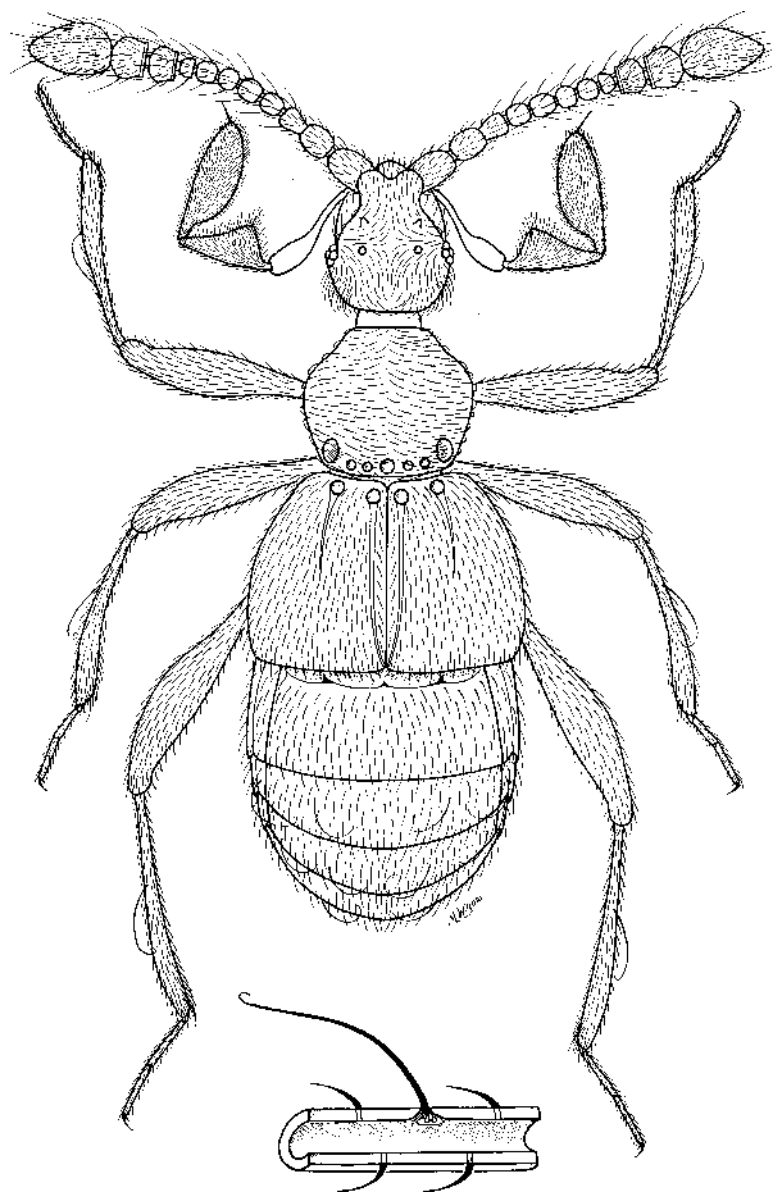


PLATE V

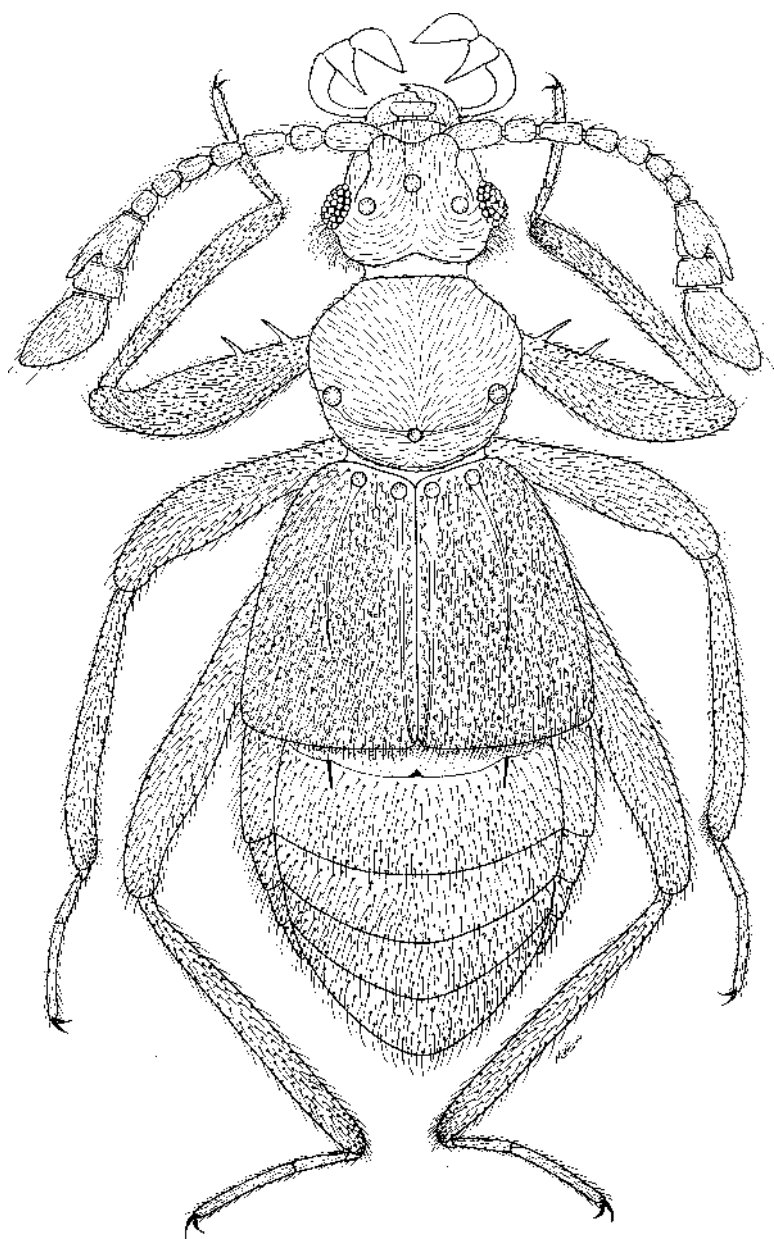
*Tychus daggyi* new species

1. dorsal aspect, female
2. stereogram of a part of right metathoracic tibia, from a slide mount at 400 diameters magnification



P L A T E   V I

*Cedius cruralis* new species, male, dorsal aspect

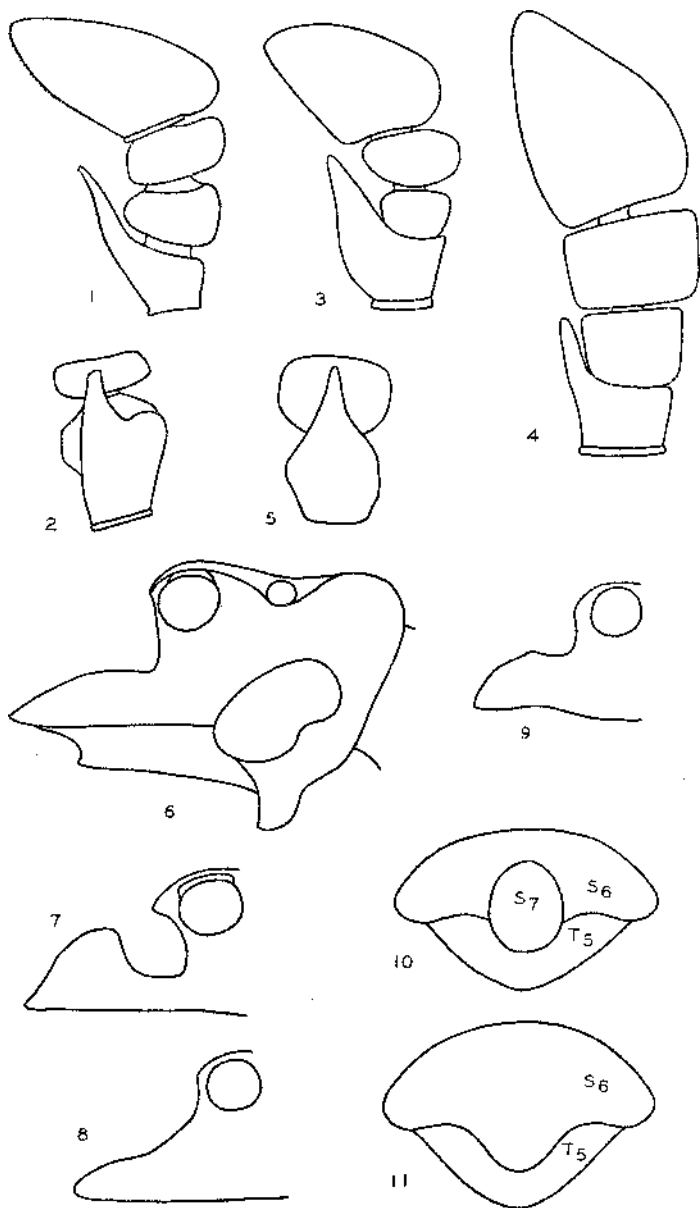


## PLATE VII

*Cedius*

1. antennal club of *cruralis*, lateral aspect
2. eighth, ninth and tenth antennal segments of *cruralis*, ventral view
3. antennal club of *spinosus*, lateral view
4. antennal club of *ziegleri*, lateral view
5. eighth and ninth antennal segments of *ziegleri*, ventral view
6. lateral aspect of head of *spinosus*, both sexes
7. lateral aspect of head of *ziegleri*, male
8. lateral aspect of head of *ziegleri*, female
9. lateral aspect of head of *cruralis*, male
10. terminal tergite and sternites of male *spinosus*
11. terminal tergite and sternite of female *spinosus*





## P L A T E   V I I I

*Cedius*

1. aedeagus, dorsal view, *ziegleri* (after Park, 1942)
2. aedeagus, dorsal view, *cruralis* (after Park, 1942)
3. aedeagus, lateral view, *cruralis*
4. aedeagus, dorsal view, *spinosus* (after Park, 1942)
5. abdominal apex, *spinosus*, male
6. abdominal apex, *cruralis*, male
7. prothoracic trochanter and femur, lateral view,  
*ziegleri*, both sexes
8. mesothoracic trochanter, *ziegleri*, both sexes
9. prothoracic trochanter and femur, lateral view,  
*spinosus obsoletus*, male
10. prothoracic trochanter-femoral outline, *spinosus*  
*spinosus*, male
11. prothoracic trochanter-femoral outline, *spinosus*, female
12. prothoracic trochanter and femur, lateral  
view, *cruralis*, male
13. mesothoracic trochanter, *spinosus*, both sexes
14. mesothoracic trochanter, *cruralis*, male
15. metathoracic trochanter, *cruralis*, male
16. prothoracic trochanter-femoral outline,  
*spinosus obsoletus*, male

